REMARKS

This is in response to the Office Action mailed September 27, 2002, in the above-referenced application. Claims 1 through 25 and new Claim 26 are pending. Claims 1 through 16 were elected for consideration in Applicant's Response to Restriction Requirement dated July 22, 2002. Claims 17 through 25 have accordingly been cancelled without prejudice or disclaimer to the filing of continuing applications thereon. Claim 26 has been added to highlight advantageous embodiments of the invention. Support for Claim 26 can be found in the application as filed, for example on Page 9, line 11 through Page 10, line 15.

The rejections of record are addressed below. Reexamination and reconsideration of this application, withdrawal of the rejection, and formal notification of the allowability of all claims as now presented are earnestly solicited in light of the remarks which follow.

By way of background, the present invention is generally directed to methods for controlling causticizing processes. Traditionally, the slaker unit within a causticizing process was controlled based on the lime to green liquor feed ratio and adjusted based on the temperature differential measured between the slaker and the green liquor stream. The present invention provides more accurate control by measuring the total titratable alkali ("TTA"), the sum of all titratable sodium compounds. The TTA of the green liquor stream may then be used to determine and subsequently adjust the density of the green liquor stream entering the slaker unit. In advantageous embodiments, the TTA may further be used to adjust the set value for the temperature difference and for correcting the set value for the ratio control.

Claims 1 through 16 stand rejected under 35 U.S.C. 112, second paragraph, as being indefinite.

In Paragraph A on Page 2, the Office Action appears to object to the recitation of the phrase "applying a model" within the claims. Applicant respectfully submits that the phrase "applying a model, " e.g. in reference the use of a mathematical model or algorithm, is not prohibited under United States practice. However, solely in an effort to advance prosecution, Claim 1 has been amended to more clearly define the steps performed.

In regards to Paragraph B on Page 2 of the Office Action, multi-stage lime-based causticizing processes are well known in the art, including the chemical reactions and exact products made within each of the recited stages. Applicant thus respectfully submits that the claims are not required to recite the chemical reactions associated with each of the causticizing stages. Applicant further directs the Examiner's attention to the application as filed on page 7, line 28 – page 8, line 32, describing the various reactions occurring within the various causticizing stages.

In regards to Paragraph C on Page 2 of the Office Action, the term "type" and reference to Figure 5 have been deleted from Claim 4. Reference to Figure 7 has similarly been deleted from Claim 10.

In regards to Paragraph D on Page 2 of the Office Action, the term "correcting" in Claim 5 has been deleted. The term "correcting" within Claim 3 has been replaced by the term "adjusting." In contrast to the opinion urged in the Office Action, the adjustment of process controllers based on measurements and calculations therefrom is well known in the art and does not indicate a "faulty" system, but merely reflects the variation that naturally arises within manufacturing processes. Claim 5 has been amended to clarify the particular "differences" involved.

In regards to Paragraph E on Page 2 of the Office Action, the term "dynamic" in Claim 7 would be readily understood by one skilled in the art to refer a model that incorporates data taken over time, e.g. a production average. The Examiner's attention is directed to the application as filed, page 11, line 28 through page 12, line 6.

In regards to Paragraph F on Page 2 of the Office Action, Claim 8 has been amended to more clearly indicate the adjustments made in the lime to green liquor ratio in response to the measured temperature.

In regards to Paragraph G on Page 2 of the Office Action, the claims have been amended to more clearly indicate how the control method "works;" i.e. that the green liquor density is determined from the total titratable alkali based on a model relating the two. The method of the invention may either be implemented by a computer or performed manually, as would be understood by one skilled in the art.

Accordingly, Applicant respectfully submits that Claims 1 through 16 as amended particularly point out and distinctly claim the subject matter which the applicant regards as the invention.

Claims 1 - 16 stand rejected under 35 U.S.C. 112, first paragraph, as well. In contrast to the opinion urged in the Office Action, Applicant respectfully submits that the term "angular coefficient" in Claim 11 is definite. The Examiner's attention is directed to the application as filed, for example on Page 10, lines 10 through 15 in which the specification notes both a specific range of values and a preferred value for the coefficient. One skilled in the art would know how to arrive at a value for the angular coefficient, particularly in light of the disclosure within the specification.

The use of process control schemes in conjunction with a range of chemical processes is well known in the art. Accordingly, one skilled in the art would know (a) how to use the model, (b) when the model was wrong and (c) when to obey the model. As noted above, one skilled in the art would further know that the model may be implemented either manually or by computer control. The nexus, i.e. the mathematic relationship, between the density and the TTA is clearly defined within the application as filed, for example on Page 9, line 31 through Page 10, line 9. In regards to the Office Action's concern regarding the term "controlling," the green liquor density is adjusted based on TTA measurements. Consequently, the green liquor density is being "controlled" based on TTA measurements. In contrast to the opinion urged in the Office Action, one skilled in the art would understand that the step of "controlling" involves making physical adjustments within the various components of the green liquor stream components, as required, and thus Claim 1 is directed to more than mere mental steps.

The Examiner is correct that TTA is mathematically related to the density, as noted above. It is, in fact, this mathematical model that is used to determine the appropriate adjustment to be made to the green liquor density. One skilled in the art would understand that the step of "determining" within Claim 1 involves the use of measurements.

Accordingly, Applicant respectfully submits that Claims 1 through 16 as amended reasonably convey to one skilled in the art that the inventor had possession of the claimed invention at the time the application was filed.

Claims 1 - 16 stand rejected under 35 U.S.C. 103(a) as unpatentable over Baines (WO 98/10137) in light of Musow (US Patent No. 5,213,663).

Baines is generally directed to the use of a neural network or fuzzy logic to control a causticizing process by measuring the proportions of a number of different green and white liquor components. Baines' measurements are made using a polarographic process, based on the electrical conductivity induced over a voltage spectrum. Consequently, Baines, considered either alone or in combination with Musow, does not teach or suggest controlling the green liquor density on the basis of total titratable alkali, as recited in the claimed invention.

Musow does not cure the deficiencies within Baines. Musow is directed to methods by which to control the sodium carbonate concentration of green liquor in a dissolving tank upstream of a slaker. Similar to Baines, conductivity measurements are used to determine the sodium carbonate concentration. Musow teaches away from the use of either density or total titratable alkali by noting them as less preferred means by which to regulate sodium carbonate concentrations. (Col. 2, lines 58 – 62). Consequently, Musow certainly does not teach or suggest a model that relates the green liquor density to total titratable alkali, as provided in the claimed invention. Musow further does not teach or suggest aspects of the invention in which lime milk TTA values are used to adjust the temperature differential controller, as recited in Claims 3 through 10.

Accordingly, Applicant respectfully submits that Claims 1 through 16 are patentable in light of the art of record, considered either alone or in combination.

CONCLUSION

It is respectfully submitted that Applicant has made a significant and important contribution to the art, which is neither disclosed nor suggested in the art. It is believed that all of the pending claims are now in condition for immediate allowance. It is requested that the Examiner telephone the undersigned if any questions remain to expedite examination of this application.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,

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Version with Markings to Show Changes Made:

Claims 1, 3, 4, 5, 8, 9, 10, and 12 have been amended as follows:

1. (Amended) A method for controlling a causticizing process which comprises slaking, causticizing and the preparation of white liquor, the slaking being carried out using a slaker into which green liquor and lime are fed to produce lime milk, the method comprising controlling the causticizing process by determining the density of the green liquor fed into the slaker based on a model that relates the density of green liquor to total tritratable alkali in the green liquor [applying a model that describes at least a part of the process] and controlling the density of the green liquor [density] on the basis of [a] total titratable alkali.

3. (Amended) A method according to claim 2, wherein the slaker is controlled on the basis of the difference between the slaker temperature and the green liquor temperature by [correcting] adjusting the set value for the temperature difference control on the basis of the difference between the target causticity of lime milk and the causticity titration or titrations, the set value for the causticity being determined [primarily] on the basis of [a] the model describing the development of the causticity prevailing after the slaker to white liquor causticity.

4. (Amended) A method according to claim 3, wherein the model in question is a static one [and that it substantially follows the type shown in the curve of Figure 5] and produces a causticity difference.

5. (Amended) A method according to claim [3] 4, wherein [the static model in question is corrected by calculating] a quotient is calculated by dividing [of] an average of the differences in white liquor and lime milk causticities [and] by a causticity difference provided by the model on the basis of a production average, and [by multiplying the quotient by a] the causticity difference [provided] produced by the model is multiplied by the quotient.

8. (Amended) A method according to claim 3, wherein the lime to green liquor ratio is controlled by [correcting] adjusting the lime to green liquor ratio using the temperature difference control in such a way that when the measured temperature deviates from the temperature target, the lime to green liquor ratio target is [corrected] changed in [to] the opposite

direction.

9. (Amended) A method according to claim 8, wherein in connection with a production change, the lime to green liquor ratio is changed on the basis of [the] a static model describing the changing of the lime to green liquor ratio during a production change.

10. (Amended) A method according to claim 9, wherein the static model describing the changing of the lime to green liquor ratio [in a situation of] during a production change substantially conforms with [the curve shown in Figure 7] a production curve.

12. (Amended) A method according to claim 11, wherein the offset is determined on the basis of the green liquor TTA and a momentary density of the green liquor by applying [a] the model including the coefficient.